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ABSTRACT

A project was conducted to derive a comprehensive list of the performances of a competence mechanic to satisfy the planning needs of automotive engineering lecturers, curriculum committees, researchers, course designers, and staff developers. A list of 127 tasks together with information about their relative importance and the frequency with which they are performed on the job were derived from a 1978 state-wide Australian survey of eighty-two firms. Based on the analysis of these tasks a list of performances including standards and conditions for each performance were compiled. A two-day induction course and a series of workshops were conducted to help project participants develop performance statement materials. Members of the Automotive Mechanics Working Party and the Australia Department of Further Education participated in project management. Recommendations include the training of all automotive mechanics teachers in the principles and processes used in performance statement development, and training teachers of other trades courses in methods used in this project. Appendixes constituting two-thirds of this report contain a project flowchart, project worksheets, topics, the performance statements, induction course and workshop materials, and an annotated bibliography. (MN)

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DERIVATION OF PERFORMANCE STATEMENTS FOR THE AUTOMOTIVE MECHANICS BASIC TRADE COURSE

RESEARCH DOCUMENTATION

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Task lists and performance statements were prepared by members of the Automotive Mechanics Working Party, Research Branch and the Curriculum Development Branch of the Department of Further Education.

The remaining sections of the report were written by :

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OVERVIEW

This project began in February, 1979, and was largely completed by May of the same year. The purpose of the exercise was to derive from the tasks known to be carried out by practising automotive vehicle mechanics a comprehensive list of the performances required of a competent mechanic. An occupation survey had previously been undertaken, and an analysis of the data collected had produced a verified list of 127 tasks together with information about the relative importance of these tasks and the frequency with which they are performed on-the-job.

This particular project deals specifically with the derivation of performance statements. These statements detail what it is that a Department of Further Education college lecturer has to teach a student undertaking the automotive basic trade course.

The performance statements specify the minimum standard of performance regarded as acceptable evidence that the learner has achieved a given objective. Thus a certain standard is defined for each learning experience. The job conditions under which an automotive mechanics basic trade student would be required to demonstrate appropriate performances are also identified. Indicators of performance are specified whenever it was not possible to stipulate standards and conditions.

The performance statements have since been used to develop a syllabus for the Automotive Mechanics Basic Trade Course. In addition, lessons are being developed by members of the working party for trialling in the colleges. It is emphasized that because some of the data arising from the original survey deals with local requirements, it will be possible for colleges to modify the educational programme to suit their own needs. The documents developed so far will assist in the more effective planning of resources. They will also be available to external organisations such as the South Australian Automobile Chamber of Commerce.

The important features of this project are described as a series of documentations rather than by means of a full-scale report. The level of reporting is considered sufficient to satisfy the needs of the following audiences: automotive engineering lecturers, curriculum committees, researchers, course designers, and staff developers. For instance, a working party contemplating an exercise similar to this performance analysis project could refer to this document for ideas regarding the approach to be used. Research and staff development support would be solicited in this context.

LIST OF MEMBERS OF THE AUTOMOTIVE MECHANICS WORKING PARTY AND THE COLLEGES THEY REPRESENT

Athol Fox (Co-ordinator)	- Research Branch
Bryce Ames	- Whyalla College of Further Education
Christopher Ayles	- Port Augusta College of Further Education
John Bicknell	- Elizabeth Community College
William Hawkes	- O'Halloran Hill College of Further Education
Peter Kinnear	- South East Community College
Edward McDonald	- Open College of Further Education
Raymond Todd	- Port Pirie Community College of Further Education
Geoffrey Wagener	- Croydon Park College of Further Education

CONTRIBUTORS TO THE PROJECT

The following people have made significant contributions to the project:

- Athol Fox (chairman of working party, full time project officer for 3 months, development of methodology and writing of portions of this document)
- Dean Kuhl (methodology and writing)
- The Curriculum Development Branch, in particular, David Furber for curriculum coordination matters
- The Training and Development Branch, in particular, Richard Willing for advice and assistance in the induction course for Working Party members
- The Educational Resources Branch, in particular, Brian Kenworthy
- Ms. J. Keightley, Messrs. R. Cannon, C. Dunnett, A. Sandery, J. Mitchell and Dr. B. Hobart for describing particular occupation research projects with which they were familiar
- Elizabeth Gadsby for designing the layout and attending to the typesetting and production of the report
- Vicki Gramazio for typesetting the report.

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SECTION 1

SECTION 1

INTRODUCTION

Late in 1978, the Automotive Programme Committee of the Department of Further Education agreed that:

- a working party be established to "... write up the achievement objectives for the total list of skills that a motor mechanic needs to acquire ...". These would be written up "in a form to meet Curriculum Development Branch guidelines".

- suitable resources be sought from Curriculum Development, Training and Development, Educational Resources and Research Branches so that materials would be available for a revised Automotive Mechanics Programme commencing 1980.

- Research Branch be requested to commit Mr. A.P. Fox to the project as co-ordinator of the working party. Liaison would be required with those metropolitan colleges in which the Automotive Mechanics Basic Trade Course is offered.

The Research Branch had already completed a project entitled, "A Survey of the Automotive Mechanics Trade - A Task Analysis".(1) The investigation was conducted with the assistance of a group of automotive engineering lecturers selected from all colleges offering the basic trade course.

The project described in this document was approved by the Superintendent (Research) and endorsed by the Superintendent (Curriculum Development) as a part of the 1979 Curriculum Research and Review Programme. It was agreed that the major Research Branch responsibilities would involve:

. choice of methodology

. design and implementation of an induction course for working party members

. coordination of the project.

Footnote:

(1) This project was also described by J.F. Nettle and A.P. Fox in their report "The Methodology of Occupational Surveys: And a Case Study among Automotive Mechanics in South Australia", submitted to Torrens C.A.E. in partial fulfilment of the requirements of a Diploma in Teaching, Torrens C.A.E., 1978.

Their report concentrates on the methodology for carrying out a task analysis using data collected from a survey of firms. Other types of occupation/industry surveys are not considered.

SECTION 2

SECTION 2

PROJECT SPECIFICATION

INTRODUCTORY REMARKS

A project specification was developed in consultation with the Curriculum Development Branch and automotive mechanics lecturing staff. The following matters are detailed in the specification:

- aim of the project as set out in the original request
- resources required to implement the project
- budget allocation
- major constraints affecting the project
- schedule of work to be done.

The completed project specification was then approved by the Superintendent (Research), and subsequently endorsed by the Superintendent (Curriculum Development) and the Automotive Mechanics Programme Committee

SPECIFICATION OF THE PROJECT

The following statements are taken directly from the original project specification:

AIM

The aim of the project is to produce a listing of performance standards (skill levels) that relate to previously identified tasks. This is to be done as a validation exercise.

The information will be used by lecturers to develop a revised educational programme of work for the motor mechanics course for implementation in 1980. The material will also be used to develop a syllabus document to be submitted to the Automotive Programme Committee and thence to the Director-General of Further Education for formal approval.

RESOURCES

The following resources are required:

- a working party with representatives from each college where the automotive mechanics basic trade course is offered. Industry representation will be determined by the Programme Committee.
- a coordinator (Mr. A.P. Fox of the Research Branch).
- representatives from the Curriculum Development, Training and Development and Educational Resources Branches as required. Meetings will be arranged by the coordinator.

. rooms to be arranged at the Training and Development Centre, typing at Head Office and duplication at the Training and Development Centre or at Head Office.

BUDGET

Adequate funds are available for:-

. Athol Fox to work on the project for 3 months commencing 16 February, 1979. This will include visits to country colleges.

. two meetings of the working party during April and May 1979.

. a two day staff development course in March 1979.

[Further Curriculum Development Branch funding has been requested for 3 meetings of the working party during the latter part of 1979 to prepare a formal syllabus document. This work is outside the terms of reference of the project but was included to indicate follow-up stages.]

CONSTRAINTS

The following major constraints affect the project:

. adequate budget allocation

. acceptance by colleges for staff releases.

PROPOSED GUIDELINES

It is envisaged that the project will be carried out using the following guidelines:

. All colleges conducting the automotive mechanics basic trade course will be represented.

. The metropolitan college representatives will be responsible for the writing of the necessary curriculum documents.

. Information will be shared on a regular basis between all colleges. This will be arranged by the coordinator.

. Visits to the country colleges will be made by the coordinator as required.

. The involvement of various head office service branches will be solicited as required.

SCHEDULE

The schedule of work to be done is listed in six stages:

Stage 1 - Preparation of project specification by the project coordinator, and Curriculum Development and Research Branch officers.

Endorsement of the project specification by the Automotive Programme Committee and the Superintendent, Curriculum

Development, followed by approval of the specification by the Superintendent, Research - deadline 16 February.

Recommendation for establishment of a working party - 16 February.

Ratification of lecturer commitment by colleges - end of February.

Stage 2 - Research and plan a suitable methodology for the production of a list of performances standards (skill levels) in relation to the occupational profile elements - project coordinator.

Stage 3 - Working party members operate in teams to develop an "occupation profile skills" matrix - prior to this members would be briefed on the approach to be used.

Stage 4 - Integration of work schedules - coordinator and combined working party.

Stage 5 - Final edit of materials - coordinator in consultation with working party members particularly. (8-10 days per member spread over several months - the country involvement would be less.)

Stage 6 - This stage would be beyond the present project. Curriculum and syllabus documents would be submitted to the Director-General - September, 1979. Research documentation would be produced as required by Research Branch staff. This documentation will in due course be tabled at a meeting of the Automotive Engineering Programme Committee.

SECTION 3

SECTION 3

DEVELOPING THE METHODOLOGY

INTRODUCTION

In 1978, a survey was conducted by the Department of Further Education into the automotive mechanics trade. An inventory of tasks was verified and this was followed by a state-wide survey of 82 firms.

After processing the results of the survey, it was possible to analyse the task items in such a way as to produce a comprehensive profile of tasks arranged in logical groupings, sequences and priorities. This assisted the working party to decide which topics should be omitted from the course, which topics should be introduced into the course and what constituted the optimum time for apprentices to capitalize best on follow-up learning in the industry. Most importantly, it also enabled the working party to develop systematically a list of performance statements suitable for operating an effective and valid educational programme.

A search of the literature was conducted to gather the information necessary for choosing the most suitable method for deriving performance objectives. It soon became apparent that any one particular approach could not be adopted in its entirety. Major modifications were necessary. Additional information was gathered by speaking with several people who were known to have expertise in industry/occupation survey and analysis work. (Refer to "Contributors to the Project" for the names of the persons consulted.) Most of these people had both knowledge and practical skills in the industry/occupation research field.

The particular methodology used in this study was planned, developed and implemented after carrying out a literature search and then consulting persons having the relevant expertise. A flowchart showing the various stages of the project, and in particular the early phases, is contained in Appendix A.

OUTLINE OF THE APPROACH USED

The methodology for developing performance statements was integrated with that for carrying out the survey of tasks required of an automotive mechanic. These two methodologies along with the information produced can be seen as successive stages in the review of the Automotive Mechanics Basic Trade Course. The production of lesson notes for lecturers would be the next stage in the review process.

The definitions for 'automotive mechanic', 'automotive industry' and of the more general terms 'industry' and 'occupation' are contained in Appendix B. These definitions were basic to the survey exercise. Also important is the fact that the title 'automotive mechanic' does not describe a single occupation but rather covers a group of occupations. Thus the task items and subsequent performance statements developed in the first two phases of the review process are common to the set of occupations listed for 'automotive mechanic' in Appendix B. Hence, both the survey project and this project provide generic 'skills' information for the class of automotive mechanic occupations.

TASK DATA AND FINDINGS

The following types of data were collected during the 1978 survey:

- frequency of task
- importance of task
- year when task first attempted and year where first competent
- frequency of giving (subletting) jobs to other firms.

The following issues were highlighted:

- In total, 127 operations were verified as being characteristic of the industry and hence of the revised basic trade course. It was noted that the programme offered by colleges covered most of these operations. Some changes were required to ensure that all operations were given adequate treatment.

- Frequency of occurrence was obtained for each operation in order to establish a measure of the degree of importance of each task. This new information assisted course planners in allocating priorities to sections of the course on the basis of 'frequency of task'. Diagnosis was found to be a task of great importance to the trade.

- Knowledge of the year a trainee is first involved in an operation, and the approximate time a person performs this operation unsupervised, enabled course designers to decide when any particular skill should first be introduced and completed. This data had not been previously available.

- An exact knowledge of the amount of sub-letting and of the items sub-let indicated which specialist tasks should be transferred into the post-trade programme. It was found that subletting is increasing and that subletting patterns differ between metropolitan and country firms.

- All operations were analysed in relation to location, size and type of firm. This gave curriculum planners information about regional requirements and in-plant training needs.

- A number of operations were identified as being outside those of an automotive mechanics tradesman. These need to be taken into consideration for post-trade courses.

- Block release attendance was shown to be a preferred pattern.

The above survey results are reported in a separate document, "A Survey of the Automotive Mechanics Trade - A Task Analysis".

PLANNING THE APPROACH USED TO DEVELOP PERFORMANCE STATEMENTS

From the outset it was accepted that performance statements would be derived from tasks identified by the survey. One of the major problems facing the project team was to develop an approach that was relevant and practical. Lecturing staff should have at their disposal a realistic and useful set of statements for revising their own college programme

and the Department should also have a syllabus document.

It was decided to survey various approaches in general use before developing a particular strategy. An examination of the literature showed that most of the subject matter was designed mainly for the undergraduate student market and as such was too academic for working party needs. Nevertheless, two documents were located which were exceptions to this general rule. These two publications are listed in the bibliography as documents suitable for the applied researcher. Even so, allowance had to be made for conditions in the Automotive Basic Trade Course in South Australia being quite different to those described in these publications.

It was then decided to approach persons who had a knowledge of and previous practical experience in developing performance statements from task information accumulated by means of a survey. Three persons were located in South Australia as having had first hand experience in this area. One of the most important benefits arising from discussions with these people was the opportunity to make an immediate assessment of the value of the particular methodology used by them. Moreover, it was possible to relate the answers given by these people to the automotive mechanics project by asking appropriate questions. This guided feedback was used to test the methodology proposed for the project.

Subsequent discussion and debate resulted in an even clearer understanding of the methodology to be used. This revised approach was tested and further developed by using various persons as 'sounding boards'. Within a month of commencement of the project, a relatively simple and practical approach was developed to the point of being in a form suitable for the induction of working party members.

Discussion with working party members has strongly indicated that any curriculum group contemplating setting up performance statements should spend a significant proportion of their time developing an approach that allows for their particular local conditions. The wholesale adoption of an overseas model, or for that matter any other scheme, was not preferred. Prior critical review of the approach to be used is essential. Furthermore, special allowance must be made for local conditions, such as number of colleges involved and the method of course review.

ANALYSING THE TASK INVENTORY

It was decided to examine in more detail the tasks required of an automotive mechanic. A task inventory had previously been constructed as the first step in the original survey. Additional sub-tasks were placed on the inventory, verified and then grouped under a series of headings. Frequency and other data collected from the survey were recorded on the inventory sheets so that a comprehensive record of task information was available in collated form. This material was then used to form links between task items as a first step in setting up a network of topics.

A sample task inventory worksheet is shown in Appendix C(a).

NETWORK OF TOPICS

The Automotive Mechanics Working Party was given the responsibility of producing a network of topics relevant to the automotive mechanics basic trade course. The intention was to set up a logical pattern of topics

useful for conversion into a list of performance statements. The level of detail of the pattern would be adjusted to suit the needs of lecturers presenting the course to students. It would also satisfy the requirement for a formal syllabus document.

Information from the survey of tasks and the task inventory were used to synthesize the structure for the classification and then the finer details. Six general categories were chosen, these being:

- engine
- transmission
- brakes, steering and suspension
- electrical
- general mechanics
- business operations and personal development.

Each of these categories was broken down into sub-categories and these in turn into sub-sub-categories. The full network of topics is printed in Appendix D of this document. This network was used as the basis for deriving performance statements.

LIST OF PERFORMANCE STATEMENTS

Performance statements were then developed by working party members from the network of topics. The general, sub and sub-sub-category levels of performance were mapped out from the topic network. Standards and conditions were also specified for each performance using a performance objectives worksheet (see Appendix C(b)). The full list of performance statements including standards and conditions is contained in Appendix E.

The standards are the minimal level of performance that are to be accepted as evidence that the learner has achieved a given objective. They were specified using the following criteria:

- occurrence
- degree of accuracy
- number of errors
- time frame or speed
- acceptable references
- consequences.

It was not possible to use the above criteria for developing those performances requiring intellectual and attitudinal skills. The above criteria apply particularly well to manipulative skills but not to those of the non-manipulative kind. Thus indicators of appropriate standard of performance were developed for these other 'skills'.

The conditions under which the student would be required to demonstrate a specified behaviour were detailed for each performance.

THE INDUCTION COURSE

It was resolved that an induction course be conducted over two days to initiate working party members in the development of performance statements. It was agreed that all Branches likely to be working on the project should be in attendance at the induction sessions. Members of these Branches would possibly become more heavily involved subsequent to the performance statements being completed. These persons would then be able to help with the formulation of project recommendations relating to later stages of the development of the course. Working party members would have the responsibility of informing their colleagues of the progress of the project.

WORKSHOP SESSIONS

A series of workshops were held to produce performance statement materials. The first of these was a three day meeting at the Panorama Community College of Further Education. Because working party members were unfamiliar with this approach, much of the early discussion concentrated on classifying basic issues. A number of two day workshops were subsequently held at other venues. Throughout these and succeeding sessions, emphasis was placed on reaching consensus especially in regard to sharing ideas with colleagues in colleges. Feedback was continuously collected by working party members and then used at later workshops.

As the project developed the coordinator edited the material produced.

A flow chart for th ion course and the workshop meetings is shown in Appendix F. Mat sed by the coordinator for the induction course sessions are shown dix G.

PROJECT MANAGEMENT

The following individuals and groups were involved in the project management:

- the working party - this group was responsible for developing the network of topics and the performance statements.
- the Automotive Mechanics Programme Committee - this group was responsible for setting the terms of reference for the project. It also maintained general oversight of curriculum matters.
- Educational Resources, Training and Development, Curriculum Development, and Research Branches - Principal Education Officers from the respective Branches met to plan the coordination of that part of the project which related to their joint involvement.
- Curriculum Development Branch staff - individuals within the Branch were responsible for integrating project information into syllabus and curriculum documentation form.
- Research Branch staff - members of the Applied Educational Research Section were responsible for developing research methodology, project coordination and preparation of research documentation.
- industry - relevant industry personnel were consulted as required.

SECTION 4

SECTION 4

FURTHER ACTION

There are two matters requiring follow-up action. One relates to internal matters affecting the Automotive Mechanics Basic Trade Course while the other is relevant to courses in other disciplines.

FOLLOW-UP RELATING TO THE REVIEW OF THE AUTOMOTIVE MECHANICS BASIC TRADE COURSE

It is considered important for all lecturers of the Automotive Mechanics Basic Trade Course to be briefed regarding the principles and processes that were used to develop the Course. Before developing their own teaching materials and devising appropriate methods of presentation and student assessment, they need to understand clearly the concept of performance statement and how they can be derived. Concurrent with the introduction of the revised course into colleges, it is necessary for all staff to undergo training similar to that of the working party.

THE WORKING PARTY CONSIDERS THAT THE FOLLOWING ACTION SHOULD BE TAKEN

- A conference of automotive mechanics lecturers should be conducted prior to the implementation of the revised course. The purpose of this conference would be to introduce the lecturers to the revised syllabus and provide a forum for discussion of matters associated with its implementation.

In addition to the recommendation for briefing lecturing staff, the working party recommends the following:

- A working party should be set up under the guidance of a nominated coordinator to determine procedures for the maintenance of teaching standards and to plan for curriculum review and evaluation. The group is to have the widest possible representation and should meet at regular intervals, these to be determined by the above coordinator in consultation with college principals.

- The above working party should arrange for the collection and collation of existing text materials into a form suitable for reference purposes.

- The above working party should enlist the assistance of the Centre for Resource Development within the Open College for the production of teaching aids.

- The working party should determine and recommend the provision of basic tools and equipment in all colleges providing the automotive basic trade course.

FOLLOW-UP IN OTHER COURSE AREAS

It is considered that courses requiring significant amounts of skills training (especially manipulative and diagnostic skills) lend themselves

to the approach outlined in this document. Thus, it is important that lecturing staff involved in course areas other than the automotive mechanics basic trade course have access to the documentation for this project. An examination of the methods will allow staff to specify an approach to be used for their particular discipline having utilised some of the procedures described in this document.

It is suggested that groups of lecturers wishing to develop valid performance statements should assess the value of the approach outlined in this document before proceeding with their own project. Curriculum Development and Research Branch staff would be in a position to give advice to interested curriculum groups. Should the decision be made to proceed with a performance analysis study, Training and Development Branch staff would be able to assist in the same manner as for this project.

In regard to this particular methodology, it is agreed by the team members that the development of a network of topics is more the province of a researcher, while the development of performance statements is more a curriculum development exercise. Nevertheless, careful integration of the two kinds of expertise is essential.

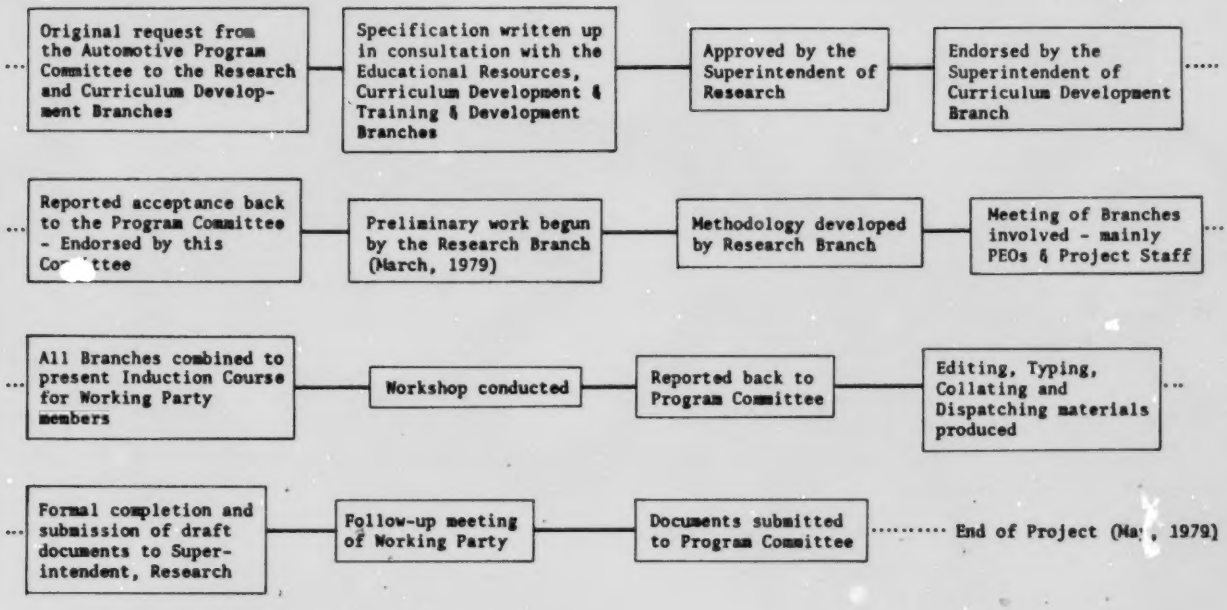
It is recommended that this documentation be brought to the notice of all three major studies committees for referral to programme committees and working parties.

APPENDICES

appendix A

APPENDIX A

PROJECT FLOWCHART


Original request from the Automotive Program Committee to the Research and Curriculum Development Branches
Specification written up in consultation with the Educational Resources, Curriculum Development & Training & Development Branches
Approved by the Superintendent of Research
Endorsed by the Superintendent of Curriculum Development Branch
Reported acceptance back to the Program Committee - Endorsed by this Committee
Preliminary work begun by the Research Branch (March, 1979)
Methodology developed by Research Branch
Meeting of Branches involved - mainly PEOs & Project Staff
All Branches combined to present Induction Course for Working Party members
Workshop conducted
Reported back to Program Committee
Editing, Typing, Collating and Dispatching materials produced
Formal completion and submission of draft documents to Superintendent, Research
Follow-up meeting of Working Party
Documents submitted to Program Committee
End of Project (May, 1979)

(A syllabus document and lesson notes have been developed since May, 1979)

appendix B

APPENDIX B

DEFINITIONS FOR INDUSTRY, OCCUPATION, AUTOMOTIVE INDUSTRY AND AUTOMOTIVE MECHANIC

DEFINITIONS OF INDUSTRY AND OCCUPATION

The Australian Bureau of Statistics defines the terms industry and occupation in the following way.

"Industry is defined as any single branch of productive activity carried out in an establishment. Persons are classified industrially as belonging to the particular branch in question irrespective of their personal occupations within the industry. For example, an electrician working at an oil refinery would have the occupation of 'electrician' but his industry would be that of 'oil refining'."

"The occupation of a person is the kind of work that he or she usually performs. The nature of the factory, business or service in which a person works has usually no direct bearing upon the classification of his or her occupation. For example, a carpenter employed by a steel-making establishment would have the occupation of 'carpenter' and industry 'steel manufacturer'."

(Cited from the Australian Bureau of Statistics publication "Industry Classification Extract No. 9 (11), Australian Capital Territory: Canberra 1976.)

In the case of the automotive industry, firms may well employ people from different occupation groups. Even so, the industry classification of these employees is still 'automotive industry' because the production and maintenance of automotive components is the characteristic productive activity carried out within this particular industry.

DEFINITIONS OF AUTOMOTIVE INDUSTRY AND AUTOMOTIVE MECHANIC

THE AUTOMOTIVE INDUSTRY

The automotive industry contains elements in the manufacturing, wholesaling and retailing, and the service areas of industry. It includes the following industry components:

Agricultural machinery repairing
Agricultural machinery wholesaling
Motor cycles or scooters repairing
Motor vehicle accessories, new, retailing
Motor vehicle accessories, new, wholesaling
Motor vehicle assembly
Motor vehicle batteries retailing (new or reconditioned)
Motor vehicle batteries wholesaling
Motor vehicle bodies assembly
Motor vehicle bodies manufacturing
Motor vehicle body conversion
Motor vehicle body panels manufacturing
Motor vehicle chassis manufacturing

Motor vehicle clutch or brake repairing
Motor body repairing
Motor cycle engines manufacturing
Motor cycle or scooter assembly
Motor cycle or scooter parts accessories wholesaling or retailing
Motor cycles manufacturing
Motor cycles or scooters repairing
Motor cycles or scooters wholesaling or retailing (new or used)
Motor scooters manufacturing
Motor trimming
Motor vehicle electrical repairing
Motor vehicle engine reconditioning
Motor vehicle parts, new, retailing
Motor vehicle parts, new, wholesaling
Motor vehicle radiator repairing
Motor vehicle repairing
Motor vehicle smash repair
Motor vehicle tyres or tubes repairing
Motor vehicle tyres or tubes retailing
Motor vehicles manufacturing
Motor vehicles, new, wholesaling or retailing
Motor vehicles, used, wholesaling or retailing

(Selected from the Australian Standard Industrial Classification.)

THE OCCUPATION CLASS OF AUTOMOTIVE MECHANIC

Automotive mechanics are employed in most components of the motor vehicle industry as well as the agricultural, manufacturing and servicing industry. An automotive mechanic can be described in the following general way:

> The duties of an automotive mechanic include the diagnosis, overhaul, repair, tuning, maintenance and testing of motor vehicles. The automotive mechanic is often required to work on all types of petrol or diesel-powered vehicles, tractors, motor cycles and stationary engines. The modern emphasis is on the detection of mechanical and electrical faults, by means of instruments which check generators, starters, batteries, ignition and ignition timing, cylinder compression, engine r.p.m., wheel balance and alignment, braking efficiency, and injection system service for diesel engines. Where the replacement or repair of defective parts is necessary, the work may entail welding, elementary hand fitting or a machining process.
>
> (Cited with modification from "Job Guide for South Australia", Australian Government Publishing Service, Canberra, 1978.)

The following occupations are selected from the Australian Bureau of Statistics publication, "Classification and Classified List of Occupations".

Automotive adviser, mechanic
Automotive engineer (so described) not professional
Brake fitter, motor vehicle
Brake mechanic, motor vehicle
Diesel motor mechanic
Dismantler, motor vehicle
Mechanic, motor vehicle
Motor cycle mechanic
Motor engineer (so described) not professional
Motor mechanic, vehicle
Patrolman, motoring organisation
Serviceman, motor vehicle
Service representative, motor garage
Service technician, motor vehicle

Tester mechanic, vehicle
Vehicle mechanic

Wheel aligner, motor vehicle

and are covered by the term 'automotive mechanic'. Thus, the term automotive mechanic represents a group or class of defined occupations and not a single occupation.

appendix C

APPENDIX C

PROJECT WORKSHEETS

(a) TASK INVENTORY WORKSHEET – Duty/Task List

. . . . . .
. . . . . .
. . . . . .

(b) PERFORMANCE OBJECTIVES WORKSHEET

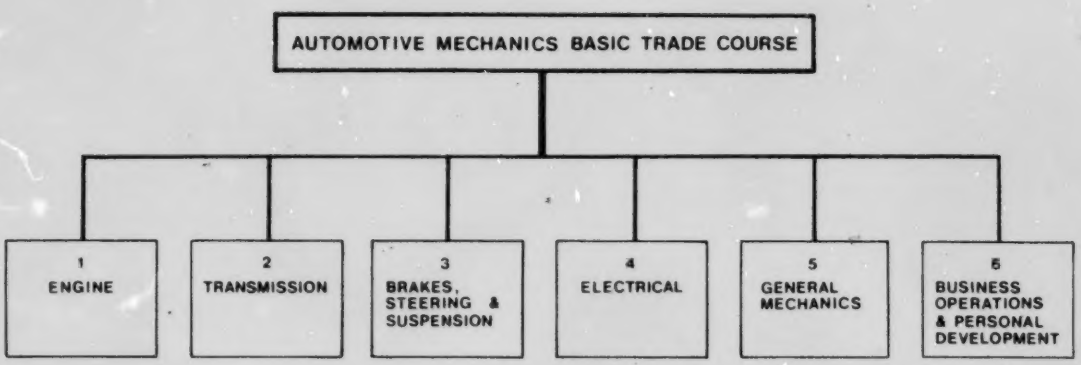
CODE	PERFORMANCE STATEMENT
4.2	The student will be able to :- • use the workshop manuals to assist in selecting the methods required to dismantle units • select the appropriate tools and equipment. • dismantle. • examine and measure to determine the serviceability of components.

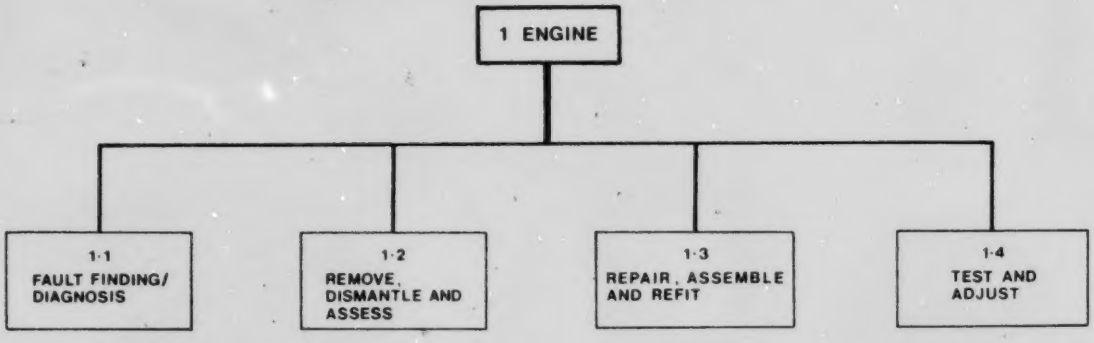
appendix D

APPENDIX D

NETWORK OF TOPICS

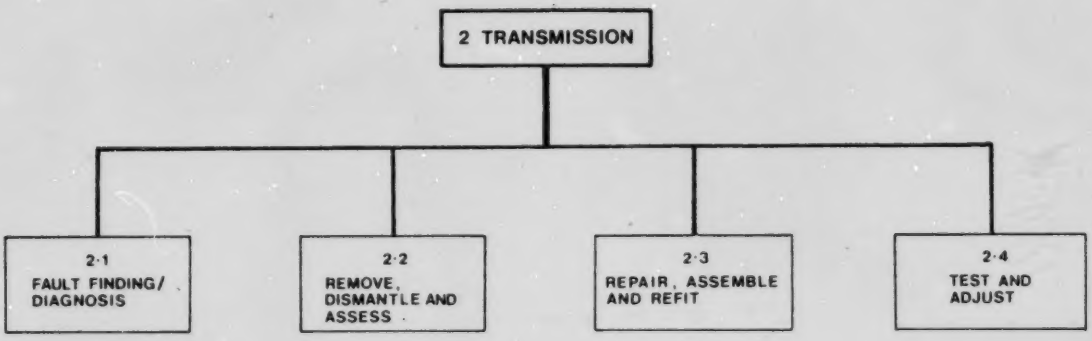
AUTOMOTIVE MECHANICS BASIC TRADE CERTIFICATE COURSE





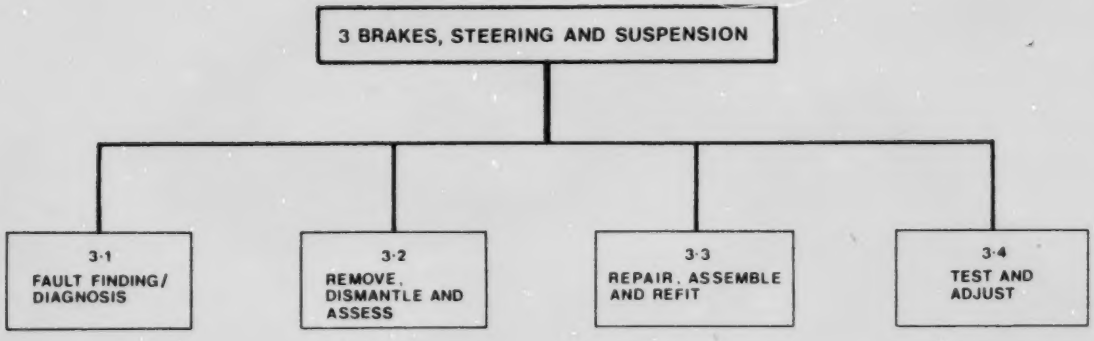
SUB SECTIONS

- cylinder head
- cylinder block
- valve mechanism
- Engine
- Cooling
- Fuel
- Exhaust
- Lubrication



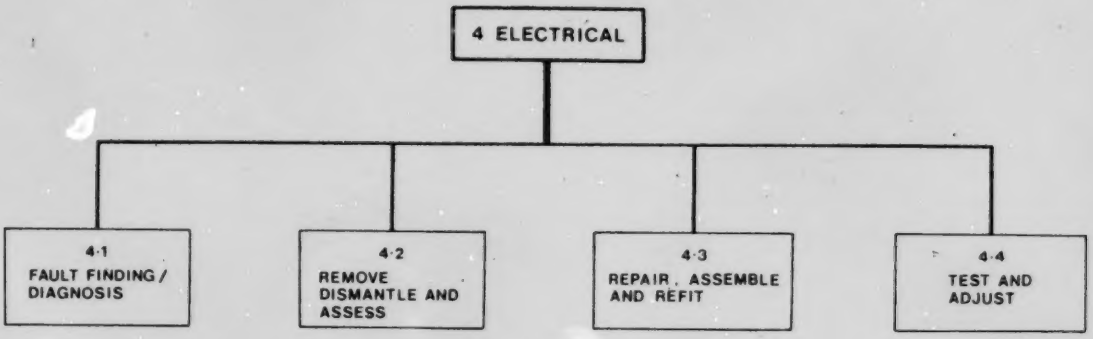
SUB SECTIONS

- couplings
- gear box
- drive line
- rear axle



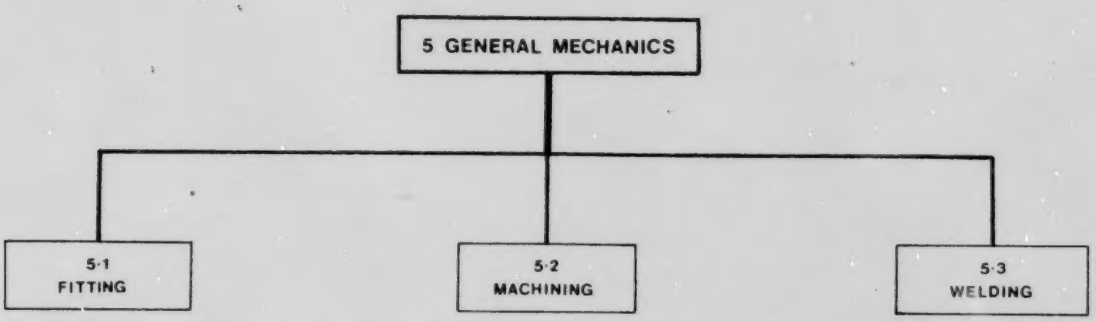
SUB SECTIONS

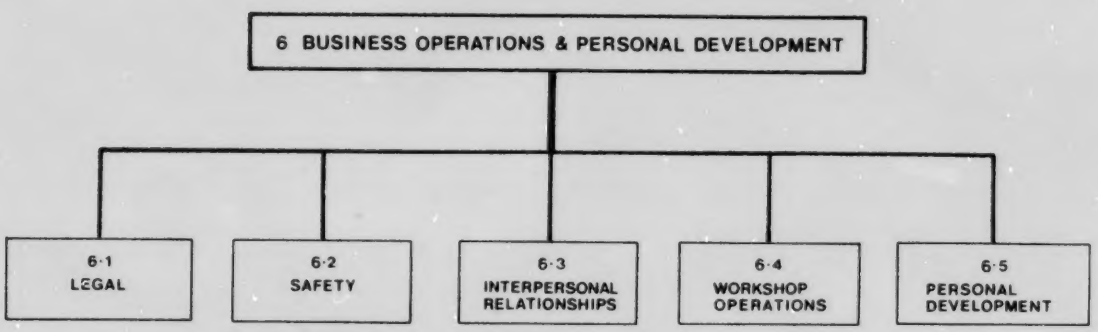
- Brake and wheel retarders
- Brake actuating systems
- Steering
- Suspension

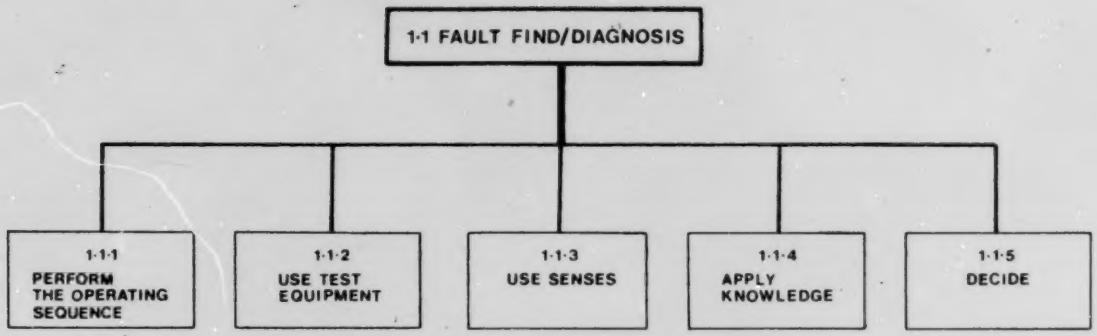


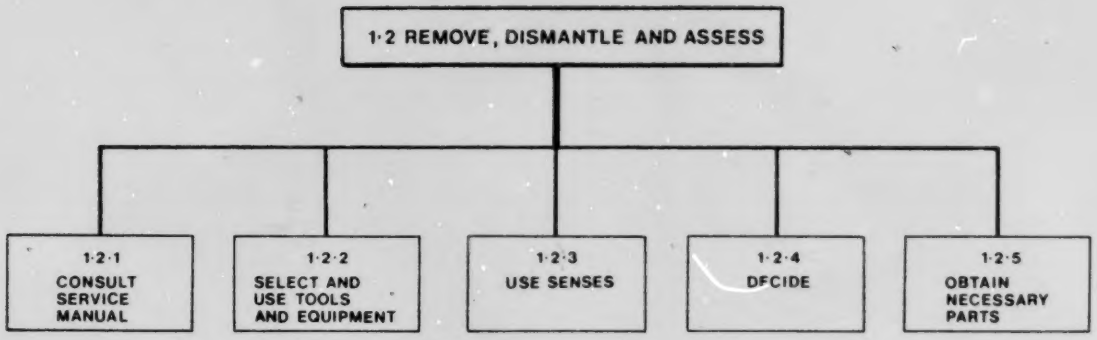
SUB SECTIONS

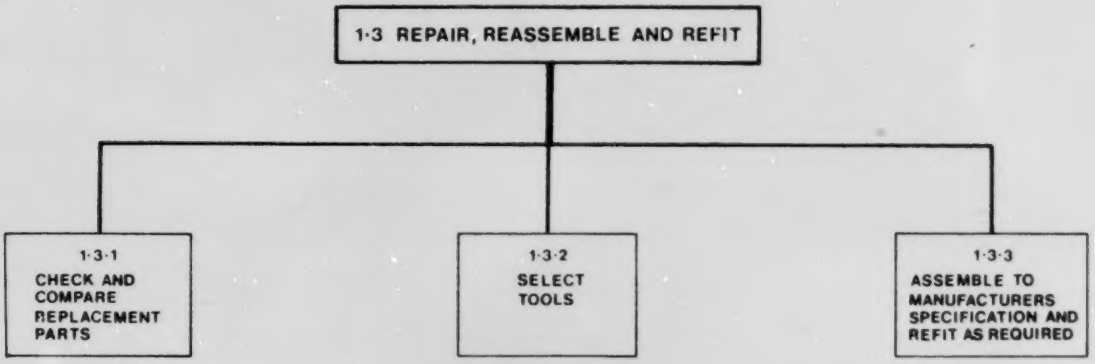
- battery
- starting system
- charging system
- ignition system
- lighting system
- accessories

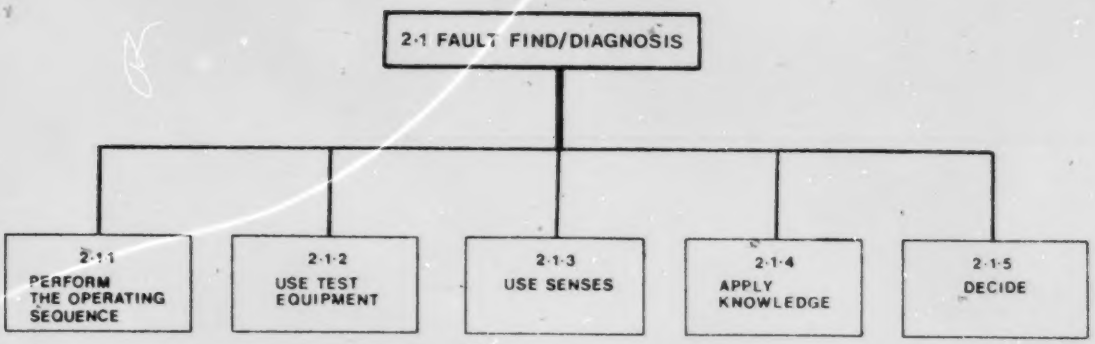


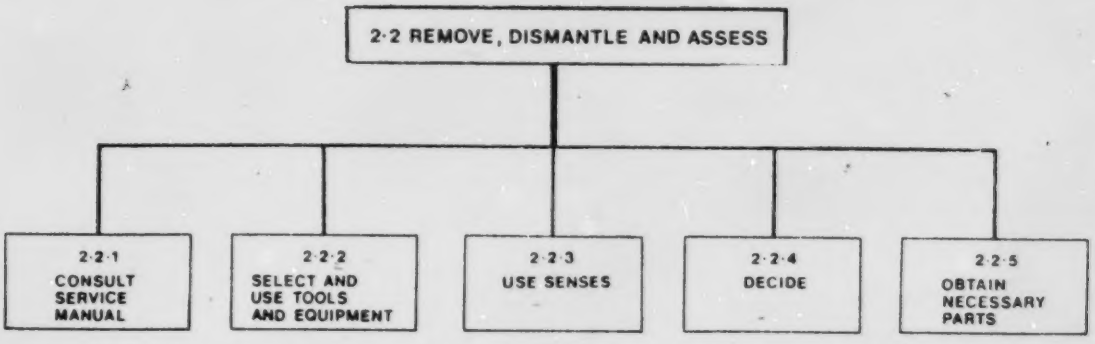


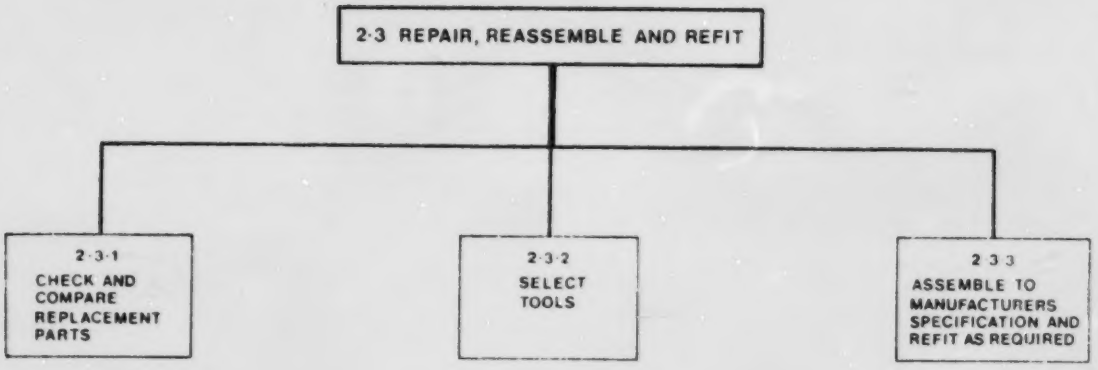

1·1 FAULT FIND/DIAGNOSIS
1·1·1 PERFORM THE OPERATING SEQUENCE
1·1·2 USE TEST EQUIPMENT
1·1·3 USE SENSES
1·1·4 APPLY KNOWLEDGE
1·1·5 DECIDE

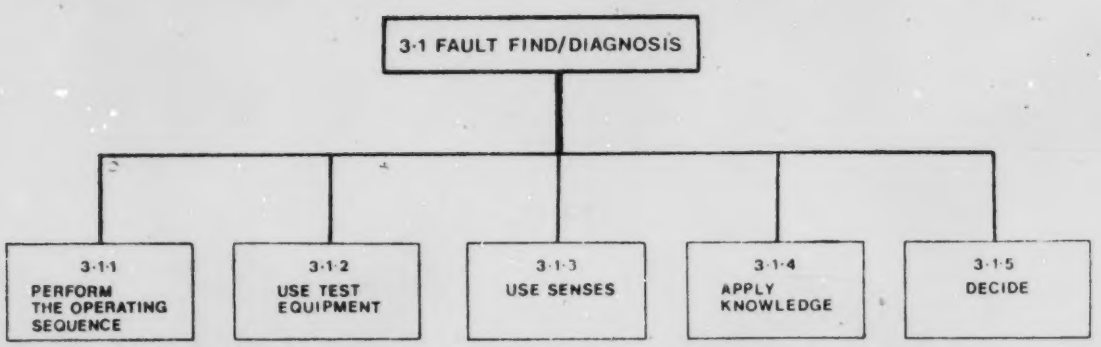

1·2 REMOVE, DISMANTLE AND ASSESS
1·2·1 CONSULT SERVICE MANUAL
1·2·2 SELECT AND USE TOOLS AND EQUIPMENT
1·2·3 USE SENSES
1·2·4 DECIDE
1·2·5 OBTAIN NECESSARY PARTS

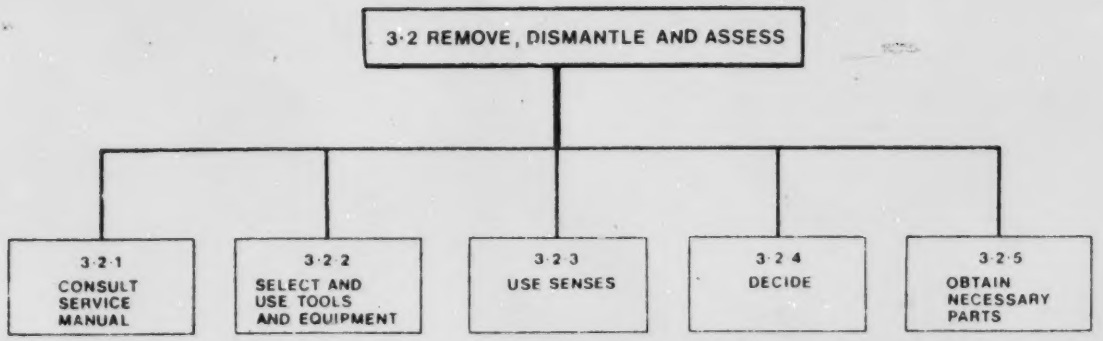

1·3 REPAIR, REASSEMBLE AND REFIT
1·3·1 CHECK AND COMPARE REPLACEMENT PARTS
1·3·2 SELECT TOOLS
1·3·3 ASSEMBLE TO MANUFACTURERS SPECIFICATION AND REFIT AS REQUIRED

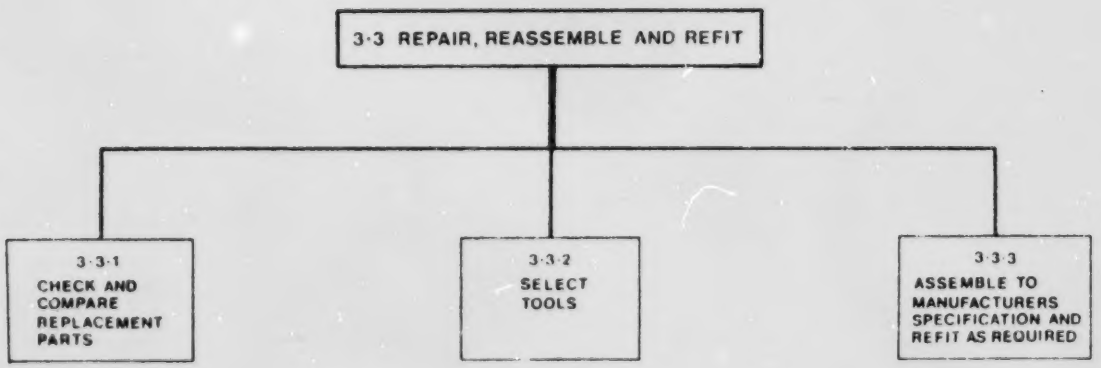

2·1 FAULT FIND/DIAGNOSIS
2·1·1 PERFORM THE OPERATING SEQUENCE
2·1·2 USE TEST EQUIPMENT
2·1·3 USE SENSES
2·1·4 APPLY KNOWLEDGE
2·1·5 DECIDE

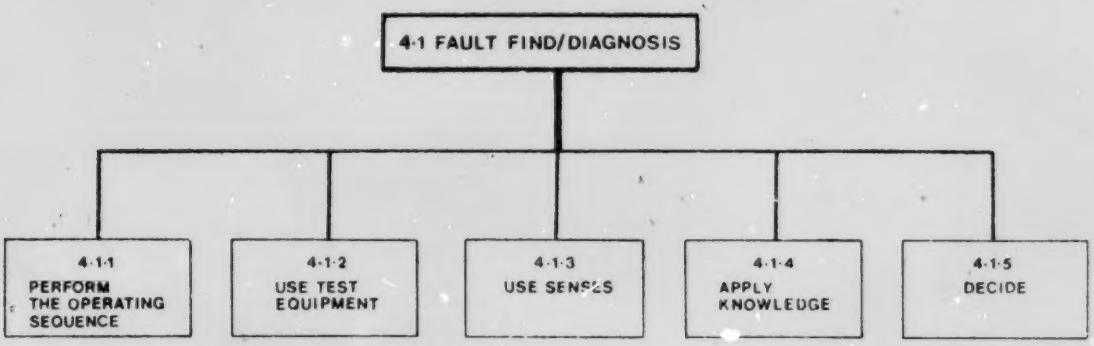

2·2 REMOVE, DISMANTLE AND ASSESS
2·2·1 CONSULT SERVICE MANUAL
2·2·2 SELECT AND USE TOOLS AND EQUIPMENT
2·2·3 USE SENSES
2·2·4 DECIDE
2·2·5 OBTAIN NECESSARY PARTS

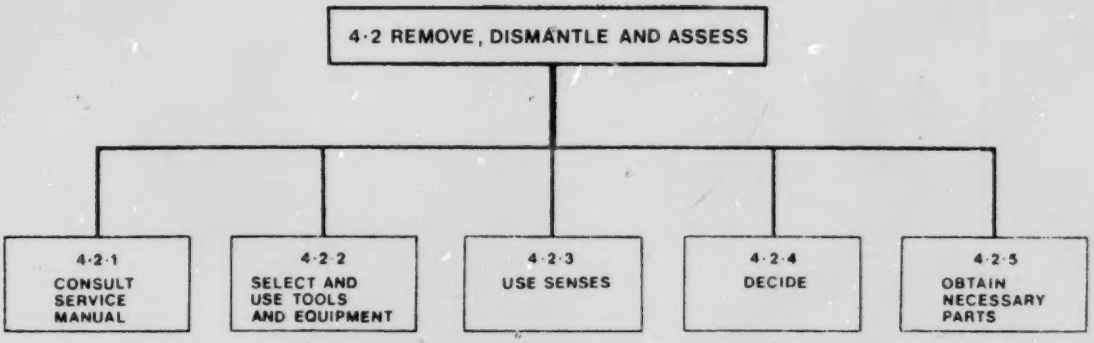

2·3 REPAIR, REASSEMBLE AND REFIT
2·3·1 CHECK AND COMPARE REPLACEMENT PARTS
2·3·2 SELECT TOOLS
2·3·3 ASSEMBLE TO MANUFACTURERS SPECIFICATION AND REFIT AS REQUIRED

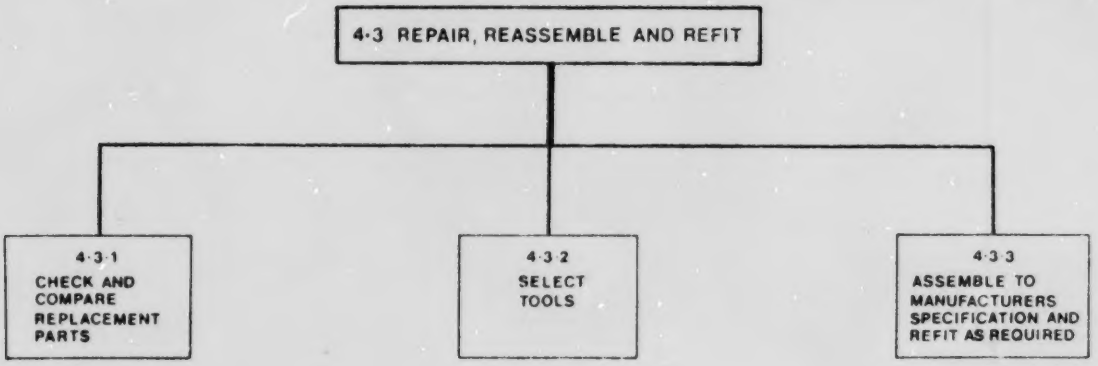

3·1 FAULT FIND/DIAGNOSIS
3·1·1 PERFORM THE OPERATING SEQUENCE
3·1·2 USE TEST EQUIPMENT
3·1·3 USE SENSES
3·1·4 APPLY KNOWLEDGE
3·1·5 DECIDE

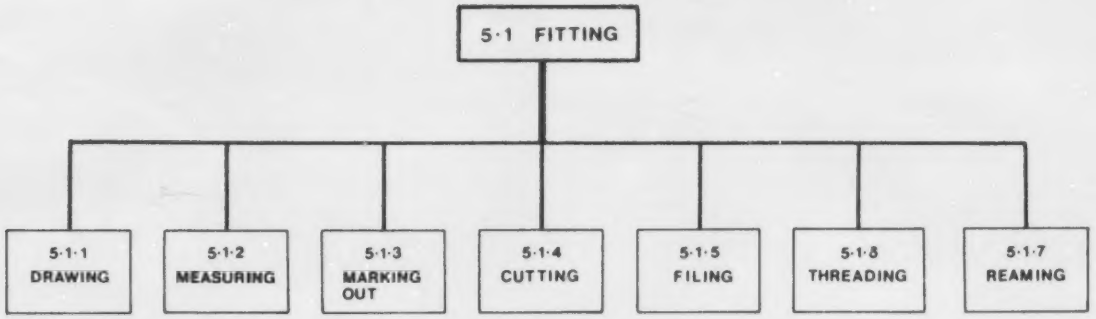

3·2 REMOVE, DISMANTLE AND ASSESS
3·2·1 CONSULT SERVICE MANUAL
3·2·2 SELECT AND USE TOOLS AND EQUIPMENT
3·2·3 USE SENSES
3·2·4 DECIDE
3·2·5 OBTAIN NECESSARY PARTS

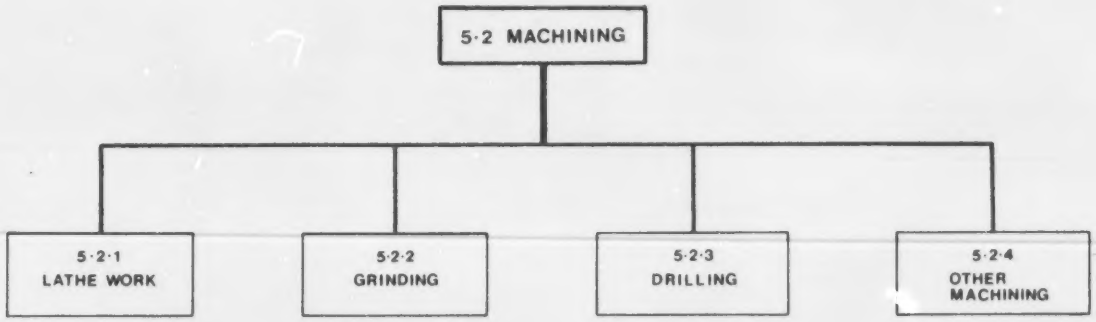

3·3 REPAIR, REASSEMBLE AND REFIT
3·3·1 CHECK AND COMPARE REPLACEMENT PARTS
3·3·2 SELECT TOOLS
3·3·3 ASSEMBLE TO MANUFACTURERS SPECIFICATION AND REFIT AS REQUIRED

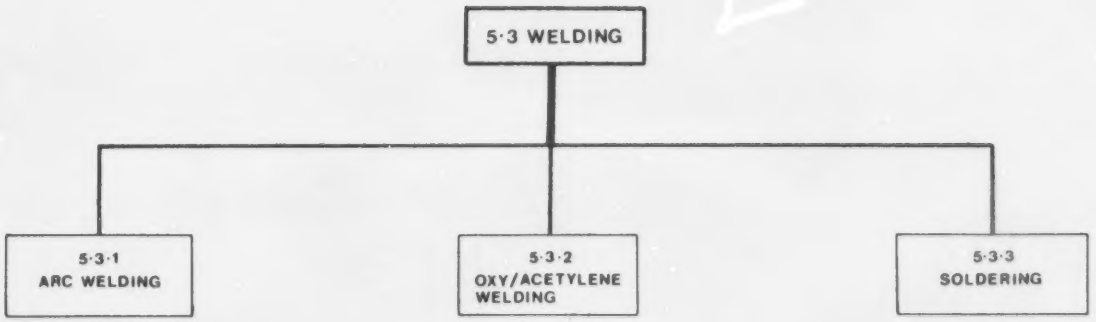

4·1 FAULT FIND/DIAGNOSIS
4·1·1 PERFORM THE OPERATING SEQUENCE
4·1·2 USE TEST EQUIPMENT
4·1·3 USE SENSES
4·1·4 APPLY KNOWLEDGE
4·1·5 DECIDE


4·2 REMOVE, DISMANTLE AND ASSESS
4·2·1 CONSULT SERVICE MANUAL
4·2·2 SELECT AND USE TOOLS AND EQUIPMENT
4·2·3 USE SENSES
4·2·4 DECIDE
4·2·5 OBTAIN NECESSARY PARTS

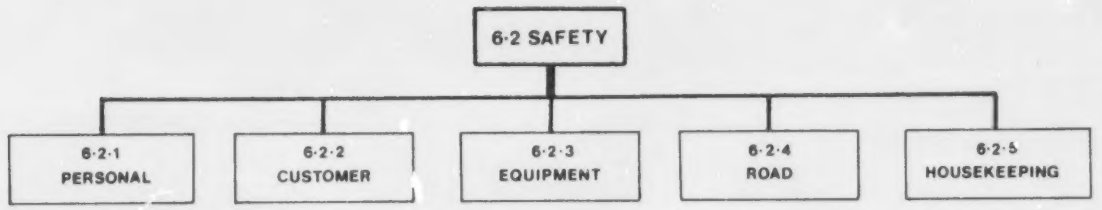

4·3 REPAIR, REASSEMBLE AND REFIT
4·3·1 CHECK AND COMPARE REPLACEMENT PARTS
4·3·2 SELECT TOOLS
4·3·3 ASSEMBLE TO MANUFACTURERS SPECIFICATION AND REFIT AS REQUIRED

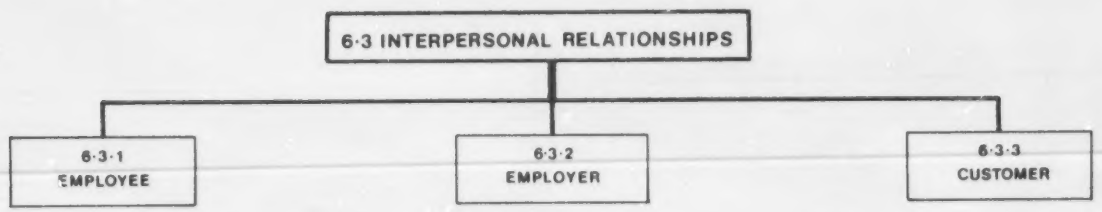

5·1 FITTING
5·1·1 DRAWING
5·1·2 MEASURING
5·1·3 MARKING OUT
5·1·4 CUTTING
5·1·5 FILING
5·1·6 THREADING
5·1·7 REAMING

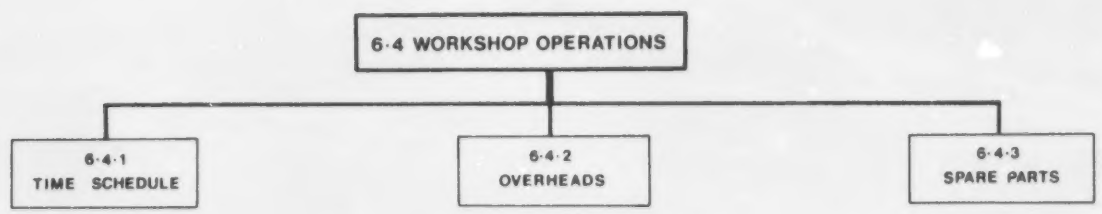

5·2 MACHINING
5·2·1 LATHE WORK
5·2·2 GRINDING
5·2·3 DRILLING
5·2·4 OTHER MACHINING

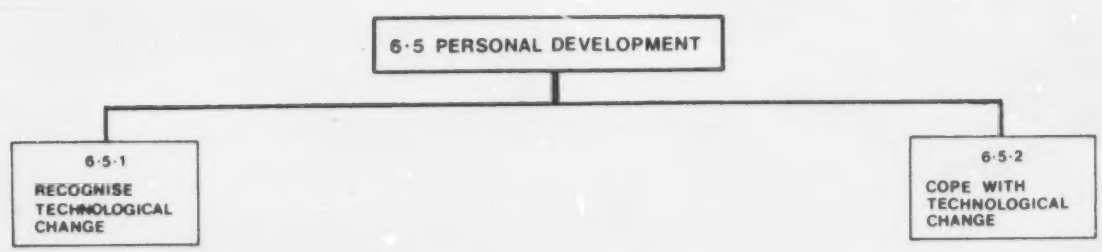

5·3 WELDING
5·3·1 ARC WELDING
5·3·2 OXY/ACETYLENE WELDING
5·3·3 SOLDERING

6·1 LEGAL
6·1·1
EMPLOYER'S AND EMPLOYEE'S RIGHTS
6·1·2
CUSTOMER'S RIGHTS


6·2 SAFETY
6·2·1
PERSONAL
6·2·2
CUSTOMER
6·2·3
EQUIPMENT
6·2·4
ROAD
6·2·5
HOUSEKEEPING


6·3 INTERPERSONAL RELATIONSHIPS
6·3·1
EMPLOYEE
6·3·2
EMPLOYER
6·3·3
CUSTOMER


6·4 WORKSHOP OPERATIONS
6·4·1
TIME SCHEDULE
6·4·2
OVERHEADS
6·4·3
SPARE PARTS


6·5 PERSONAL DEVELOPMENT
6·5·1
RECOGNISE TECHNOLOGICAL CHANGE
6·5·2
COPE WITH TECHNOLOGICAL CHANGE

appendix E

APPENDIX E
LIST OF PERFORMANCE STATEMENTS

CODE	ENGINE
1	Given lessons, assignments, private study and work experience students will be able to: . identify components . diagnose faults . fit accessories . carry out repairs and adjustments by applying basic principles to the scandards specified by manufacturers and Australian Design Rules.
CODE	**TRANSMISSIONS**
2	Given lessons, assignments, private study and work experience students will be able to: . identify components . diagnose faults . fit accessories . carry out repairs and adjustments by applying basic principles to the standards specified by manufacturers and Australian Design Rules.
CODE	**BRAKES, STEERING AND SUSPENSION**
3	Given lessons, assignments, private study and work experience students will be able to: . identify components . diagnose faults . fit accessories . carry out repairs and adjustments by applying basic principles to the standards specified by manufacturers and Australian Design Rules.
CODE	**ELECTRICAL**
4	Given lessons, assignments, private study and work experience students will be able to: . identify components . diagnose faults . fit accessories . carry out repairs and adjustments by applying basic principles to the standards specified by manufacturers and Australian Design Rules.
CODE	**GENERAL MECHANICS**
5	Given lessons, assignments, practical projects, private study and work experience students will be able to apply the principles and practices of: . measuring . welding and soldering . fitting and machining to the standards specified by Colleges; manufacturers and industrial codes.
CODE	**BUSINESS OPERATIONS & PERSONAL DEVELOPMENT**
6	Given lessons, assignments, private study and work experience graduates will be able to demonstrate their knowledge and attitude in respect to: . business operations . personal development to an acceptable standard as determined by the college or the appropriate trade organisation.

CODE	FAULT FINDING/DIAGNOSIS
1·1	The student will be able to: . operate the unit on the road, dynamometer or in the workshop . using test equipment, symptoms guide and knowledge and make the appropriate decision.
CODE	**REMOVE, DISMANTLE AND ASSESS**
1·2	The student will be able to: . use the workshop manuals to assist in selecting the methods required to dismantle units . select the appropriate tools and equipment . dismantle . examine and measure to determine the serviceability of components.
CODE	**REPAIR, ASSEMBLE AND REFIT**
1·3	The student will be able to: . check new parts received to verify that they are correct for the application . select the appropriate tools and equipment to carry out the operations necessary for repair and assembly . reassemble the unit under workshop conditions to manufacturers or legally required standards in allocated times.
CODE	**TEST AND ADJUST**
1·4	The student will be able to: . systematically test the unit using appropriate test equipment in the workshop or on the road . carry out adjustments necessary to obtain optimum performance in allocated times.
CODE	**FAULT FINDING/DIAGNOSIS**
2·1	The student will be able to: . operate the unit on the road, dynamometer or in the workshop . using test equipment, symptoms guide and knowledge and make the appropriate decision.
CODE	**REMOVE, DISMANTLE AND ASSESS**
2·2	The student will be able to: . use the workshop manuals to assist in selecting the methods required to dismantle units . select the appropriate tools and equipment . dismantle . examine and measure to determine the serviceability of components.
CODE	**REPAIR, ASSEMBLE AND REFIT**
2·3	The student will be able to: . check new parts received to verify that they are correct for the application . select the appropriate tools and equipment to carry out the operations necessary for repair and assembly . reassemble the unit under workshop conditions to manufacturers or legally required standards in allocated times.
CODE	**TEST AND ADJUST**
2·4	The student will be able to: . systematically test the unit using appropriate test equipment in the workshop or on the road . carry out adjustments necessary to obtain optimum performance in allocated times.

CODE	FAULT FINDING/DIAGNOSIS
3·1	The student will be able to: . operate the unit on the road, dynamometer or in the workshop . use test equipment, symptoms guide and knowledge and make the appropriate decision.
CODE	**REMOVE, DISMANTLE AND ASSESS**
3·2	The student will be able to: . use the workshop manuals to assist in selecting the methods required to dismantle units . select the appropriate tools and equipment . dismantle . examine and measure to determine the serviceability of components.
CODE	**REPAIR, ASSEMBLE AND REFIT**
3·3	The student will be able to: . check new parts received to verify that they are correct for the application . select the appropriate tools and equipment to carry out the operations necessary for repair and assembly . reassemble the unit under workshop conditions to manufacturers or legally required standards in allocated times.
CODE	**TEST AND ADJUST**
3·4	The student will be able to: . systematically test the unit using appropriate test equipment in the workshop or on the road . carry out adjustments necessary to obtain optimum performance in allocated times.
CODE	**FAULT FINDING/DIAGNOSIS**
4·1	The student will be able to: . operate the unit on the road, dynamometer, or in the workshop . use the test equipment, symptoms guide and knowledge as necessary and make the appropriate decision.
CODE	**REMOVE, DISMANTLE AND ASSESS**
4·2	The student will be able to: . use the workshop manuals to assist in selecting the methods required to dismantle units . select the appropriate tools and equipment . dismantle . examine and measure to determine the serviceability of components.
CODE	**REPAIR, ASSEMBLE AND REFIT**
4·3	The student will be able to: . check new parts received to verify that they are correct for the application . select the appropriate tools and equipment to carry out the operations necessary for repair and assembly . reassemble the unit under workshop conditions to manufacturers or legally required standards in allocated times.
CODE	**TEST AND ADJUST**
4·4	The student will be able to: . systematically test the unit using appropriate test equipment in the workshop or on the road . carry out adjustments necessary to obtain optimum performance in allocated times.

CODE	FITTING
5·1	The student will be able to: . select the equipment and method to produce a project to specification.
CODE	**MACHINING**
5·2	The student will be able to: . recognise . appreciate other types of machines applicable to certain processes required in the automotive repair industry.
CODE	**WELDING**
5·3	The student will be able to: . prepare metals and equipment for soldering . use the necessary material and techniques to produce a project to specification.
CODE	**LEGAL**
6·1	The student will be able to state: . his . the employer's . the customers rights and obligations to standards specified by the colleges or trade organisations.
CODE	**SAFETY**
6·2	The student will be able to: . identify factors relating to personal injury to himself or others . damage to workshop resources . damage to customer's property to standards specified by the colleges and trade organisations.
CODE	**INTERPERSONAL RELATIONSHIPS**
6·3	The student will be able to: . identify the personal qualities which promote good relationships with other employees, employers and customers.
CODE	**WORKSHOP OPERATIONS**
6·4	The student will be able to: . appreciate the requirements for standard times and logical repair sequences . identify workshop overheads . prepare spare parts schedules according to the trade and to standards specified by colleges.
CODE	**PERSONAL DEVELOPMENT**
6·5	The student will be able to: . recognize technological changes . demonstrate the skills and attitudes necessary to cope with technological change to standards specified by the colleges.
CODE	**PERFORM THE OPERATING SEQUENCE**
1·1·1	The students will be able to: . select the correct service manual . find the required information . carry out the procedure as specified.

CODE	USE TEST EQUIPMENT
1·1·2	The student will be able to: . select the correct test equipment . connect and set where necessary to specifications . carry out the procedure and compare findings with maker's recommendations.
CODE	**USE SENSES**
1·1·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**APPLY KNOWLEDGE**
1·1·4	The student will be able to: . describe the operation of the unit under test . employ that knowledge to identify the malfunctioning component/s.
CODE	**DECIDE**
1·1·5	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**CONSULT SERVICE MANUAL**
1·2·1	The student will be able to: . select the correct service manual . read and decipher the information to extract the required service procedures and data.
CODE	**SELECT AND USE TOOLS AND EQUIPMENT**
1·2·2	The student will be able to: . select the correct tools and equipment . use them in a proper manner to dismantle the unit.
CODE	**USE SENSES**
1·2·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**DECIDE**
1·2·4	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**OBTAIN NECESSARY PARTS**
1·2·5	The student will be able to: . order appropriate parts in accordance with parts terminology and procedures.

CODE	CHECK AND COMPARE REPLACEMENT PARTS
1·3·1	The students will be able to: . identify . compare . modify replacement parts to restore units to manufacturer's specifications.
CODE	**SELECT TOOLS**
1·3·2	The students will be able to: . select the appropriate tools necessary . replace or repair the unit to manufacturer specifications.
CODE	**ASSEMBLE TO MANUFACTURERS SPECIFICATIONS**
1·3·3	The student will be able to: . assemble . refit units as required in accordance with manufacturers and legally required standards within allotted times.
CODE	**SELECT EQUIPMENT**
1·4·1	The student will be able to: . select . set and connect . use appropriate test equipment for checking units.
CODE	**USE AND ADJUST**
1·4·2	The student will be able to: . interpret readings . carry out adjustments according to manufacturer specifications.
CODE	**ASSESS AND READJUST**
1·4·3	The student will be able to: . assess results . make final adjustments if necessary to obtain optimum performance.
CODE	**PERFORM THE OPERATING SEQUENCE**
2·1·1	The students will be able to: . select the correct service manual . find the required information . carry out the procedure as specified.
CODE	**USE TEST EQUIPMENT**
2·1·2	The student will be able to: . select the correct test equipment . connect and set where necessary to specifications . carry out the procedure and compare findings with maker's recommendations.
CODE	**USE SENSES**
2·1·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.

CODE	APPLY KNOWLEDGE
2·1·4	The student will be able to: . describe the operation of the unit under test . employ that knowledge to identify the malfunctioning component/s.
CODE	**DECIDE**
2·1·5	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**CONSULT SERVICE MANUAL**
2·2·1	The student will be able to: . select the correct service manual . read and decipher the information to extract the required service procedures and data.
CODE	**SELECT AND USE TOOLS AND EQUIPMENT**
2·2·2	The student will be able to: . select the correct tools and equipment . use them in a proper manner to dismantle the unit.
CODE	**USE SENSES**
2·2·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**DECIDE**
2·2·4	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**OBTAIN NECESSARY**
2·2·5	The student will be able to: . order appropriate parts in accordance with parts terminology and procedures.
CODE	**CHECK AND COMPARE REPLACEMENT PARTS**
2·3·1	The students will be able to: . identify . compare . modify replacement parts to restore units to manufacturer's specifications.
CODE	**SELECT TOOLS**
2·3·2	The students will be able to: . select the appropriate tools necessary . replace or repair the unit to manufacturer specifications.

CODE	ASSEMBLE TO MANUFACTURERS SPECIFICATIONS
2·3·3	The student will be able to: . assemble . refit units as required in accordance with manufacturers and legally required standards within allotted times.
CODE	**SELECT EQUIPMENT**
2·4·1	The student will be able to: . select . set and connect . use appropriate test equipment for checking units.
CODE	**USE AND ADJUST**
2·4·2	The student will be able to: . interpret readings . carry out adjustments according to manufacturer specifications.
CODE	**ASSESS AND READJUST**
2·4·3	The student will be able to: . assess results . make final adjustments if necessary to obtain optimum performance.
CODE	**PERFORM THE OPERATING SEQUENCE**
3·1·1	The students will be able to: . select the correct service manual . find the required information . carry out the procedure as specified.
CODE	**USE TEST EQUIPMENT**
3·1·2	The student will be able to: . select the correct test equipment . connect and set where necessary to specifications . carry out the procedure and compare findings with maker's recommendations.
CODE	**USE SENSES**
3·1·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**APPLY KNOWLEDGE**
3·1·4	The student will be able to: . describe the operation of the unit under test . employ that knowledge to identify the malfunctioning component/s.
CODE	**DECIDE**
3·1·5	The student will be able to: . identify the cause of the malfunction and specify remedial action.

CODE	CONSULT SERVICE MANUAL
3·2·1	The student will be able to: . select the correct service manual . read and decipher the information to extract the required service procedures and data.
CODE	**SELECT AND USE TOOLS AND EQUIPMENT**
3·2·2	The student will be able to: . select the correct tools and equipment . use them in a proper manner to dismantle the unit.
CODE	**USE SENSES**
3·2·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**DECIDE**
3·2·4	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**OBTAIN NECESSARY PARTS**
3·2·5	The student will be able to: . order appropriate parts in accordance with parts terminology and procedures.
CODE	**CHECK AND COMPARE REPLACEMENT PARTS**
3·3·1	The students will be able to: . identify . compare . modify replacement parts to restore units to manufacturer's specifications.
CODE	**SELECT TOOLS**
3·3·2	The students will be able to: . select the appropriate tools necessary . replace or repair the unit to manufacturer specifications.
CODE	**ASSEMBLE TO MANUFACTURERS SPECIFICATIONS**
3·3·3	The student will be able to: . assemble . refit units as required in accordance with manufacturers and legally required standards within allotted times.
CODE	**SELECT EQUIPMENT**
3·4·1	The student will be able to: . select . set and connect . use appropriate test equipment for checking units.

CODE	USE AND ADJUST
3·4·2	The student will be able to: . interpret readings . carry out adjustments according to manufacturer specifications.
CODE	**ASSESS AND READJUST**
3·4·3	The student will be able to: . assess results . make final adjustments if necessary to obtain optimum performance.
CODE	**PERFORM THE OPERATING SEQUENCE**
4·1·1	The students will be able to: . select the correct service manual . find the required information . carry out the procedure as specified.
CODE	**USE TEST EQUIPMENT**
4·1·2	The student will be able to: . select the correct test equipment . connect and set where necessary to specifications . carry out the procedure and compare findings with maker's recommendations.
CODE	**USE SENSES**
4·1·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**APPLY KNOWLEDGE**
4·1·4	The student will be able to: . identify the malfunctioning component/s by using knowledge of operation and test results.
CODE	**DECIDE**
4·1·5	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**CONSULT SERVICE MANUAL**
4·2·1	The student will be able to select the correct service manual from the component identification plate and extract the required data.
CODE	**SELECT AND USE TOOLS AND EQUIPMENT**
4·2·2	By consulting the workshop manual the student will be able to: . select tools, equipment and method . correctly dismantle the unit according to the specification.
CODE	**USE SENSES**
4·2·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.

CODE	DECIDE
4·2·4	The student will be able to: . identify the cause of the malfunction and specify remedial action.
CODE	**OBTAIN NECESSARY PARTS**
4·2·5	The student will be able to: . order appropriate parts in accordance with parts terminology and procedures.
CODE	**CHECK AND COMPARE REPLACEMENT PARTS**
4·3·1	The students will be able to: . identify . compare . modify replacement parts to restore units to manufacturer's specifications
CODE	**SELECT TOOLS**
4·3·2	The students will be able to: . select the appropriate tools necessary . replace or repair the unit to manufacturer specifications.
CODE	**ASSEMBLE TO MANUFACTURERS SPECIFICATIONS AND REFIT**
4·3·3	The students will be able to use the senses of: . sight . hearing . smell . touch in considering all available information.
CODE	**SELECT EQUIPMENT**
4·4·1	The student will be able to: . select . set and connect . use appropriate test equipment for checking units.
CODE	**ASSESS AND ADJUST**
4·4·3	The student will be able to: . assess results . make final adjustments if necessary to obtain optimum performance.
CODE	**DRAWING**
5·1·1	The student will be able to: . interpret diagrams . produce dimension sketches observing Australian Engineering Drawing Standards.
CODE	**MEASURING**
5·1·2	The student will be able to: . measure and take readings to a standard of accuracy determined by the colleges and/or Manufacturer's specification.
CODE	**MARKING OUT**
5·1·3	The student will be able to: . transpose drawing information to the project material to an accuracy determined by the colleges.

CODE	CUTTING
5·1·4	The student will be able to: . select the equipment and method required to produce a project to specification.
CODE	**FILING**
5·1·5	The student will be able to: . select the equipment and method required to produce a project to specification.
CODE	**THREADING**
5·1·6	The student will be able to: . select the equipment and method required to produce a project to specification.
CODE	**REAMING**
5·1·7	The student will be able to: . select the equipment and method required to produce a project to specification.
CODE	**LATHEWORK**
5·2·1	The student will be able to: . use a lathe to carry out machining operations . follow drawn or detailed instructions to produce components to specifications.
CODE	**GRINDING**
5·2·2	The student will be able to: . identify . correctly use various types of grinders used in the automotive repair industry to safe working practices as specified by the Department of Labour and Industry.
CODE	**DRILLING**
5·2·3	The student will be able to: . identify . correctly use various types of drilling machines used in the automotive repair industry to safe working practices as specified by the Department of Labour and Industry.
CODE	**OTHER MACHINES**
5·2·4	The student will be able to: . recognise . state the functions of other types of machines applicable to certain processes required in the automotive repair industry.
CODE	**ARC WELDING**
5·3·1	The student will be able to use: . electric arc welding equipment and techniques to safely produce welds to an acceptable standard set by the colleges and automotive repair industry.
CODE	**GAS WELDING**
5·3·2	The student will be able to: . use gas welding equipment to produce welds of acceptable standard set by the colleges and automotive repair industry.

CODE	SOLDERING
5·3·3	The student will be able to: . prepare metals and equipment for soldering . use the necessary material and techniques to produce a project to specifications.
CODE	**LEGAL EMPLOYER AND EMPLOYEE RIGHTS**
6·1·1	The student will be able to: . state his and his employer's rights and obligations under the contract of indenture . identify the role of the Apprentice Commission in the administration of the apprenticeship act . discuss the employee's rights and obligation when he is a party to damage, to the employer's property.
CODE	**LEGAL CUSTOMER'S RIGHTS**
6·1·2	The student will be able to: . state the rights and obligations of the customer and the business with regard to the job card as a legal agreement, work not satisfactorily completed, the payment of accounts and damage to the customer's property . discuss the employee's rights and obligations if he is a party to damage of the customer's property to standards specified by the colleges or trade organisation.
CODE	**SAFETY - PERSONAL**
6·2·1	The student will be able to: . identify the risks which could result in personal injury to self or others . state what steps that should be taken to minimise those risks in situations applicable to his role as an automotive mechanic.
CODE	**SAFETY - CUSTOMER PROPERTY**
6·2·2	The student will be able to: . state the precautions which must be taken to minimise the risks to customer's property in any given situation.
CODE	**SAFETY - EQUIPMENT**
6·2·3	The student will be able to: . demonstrate his ability to use any given piece of workshop equipment such that the possibility of damage to the equipment or vehicle component or personal injury is minimised.
CODE	**SAFETY - ROAD**
6·2·4	The student will be able to: . answer selected questions about the Road Traffic Act . state the principles of defensive driving . discuss the major causes and costs of road accidents.
CODE	**SAFETY - HOUSEKEEPING**
6·2·5	The student will be able to: . explain the importance of good housekeeping with respect to workshop operations and customer confidence to standards set by the colleges industry and government.
CODE	**EMPLOYEE/EMPLOYER/CUSTOMER**
6·3·1	The student will be able to: . identify those personal qualities which promote good relationships with other employees, his employer and the customers.

CODE	WORKSHOP OPERATION - TIME SCHEDULES
6·4·1	The student will be able to: . state the requirements for standard repair times . recognise the needs for logical repair sequences in his role as an automotive mechanic.
CODE	**WORKSHOP OPERATION - OVERHEADS**
6·4·2	The student will be able to: . identify the overheads of the workshop operations . associate them to job costing in his role as an automotive mechanic.
CODE	**WORKSHOP OPERATION - SPARE PARTS**
6·4·3	The student will be able to: . identify the vehicle and component make and model . communicate in parts terminology with store personnel in his role as an automotive mechanic.
CODE	**PERSONAL DEVELOPMENT - RECOGNIZE TECHNOLOGICAL CHANGE**
6·5·1	The student will be able to: . identify and describe recent technological changes on motor vehicles . state the reasons for those changes . describe the effects of those changes to standards set by the colleges.
CODE	**PERSONAL DEVELOPMENT - COPING WITH TECHNOLOGICAL CHANGE**
6·5·2	The student will be able to: . state where information about technological changes on motor vehicles is available . extract information from those resources to standards set by the colleges.

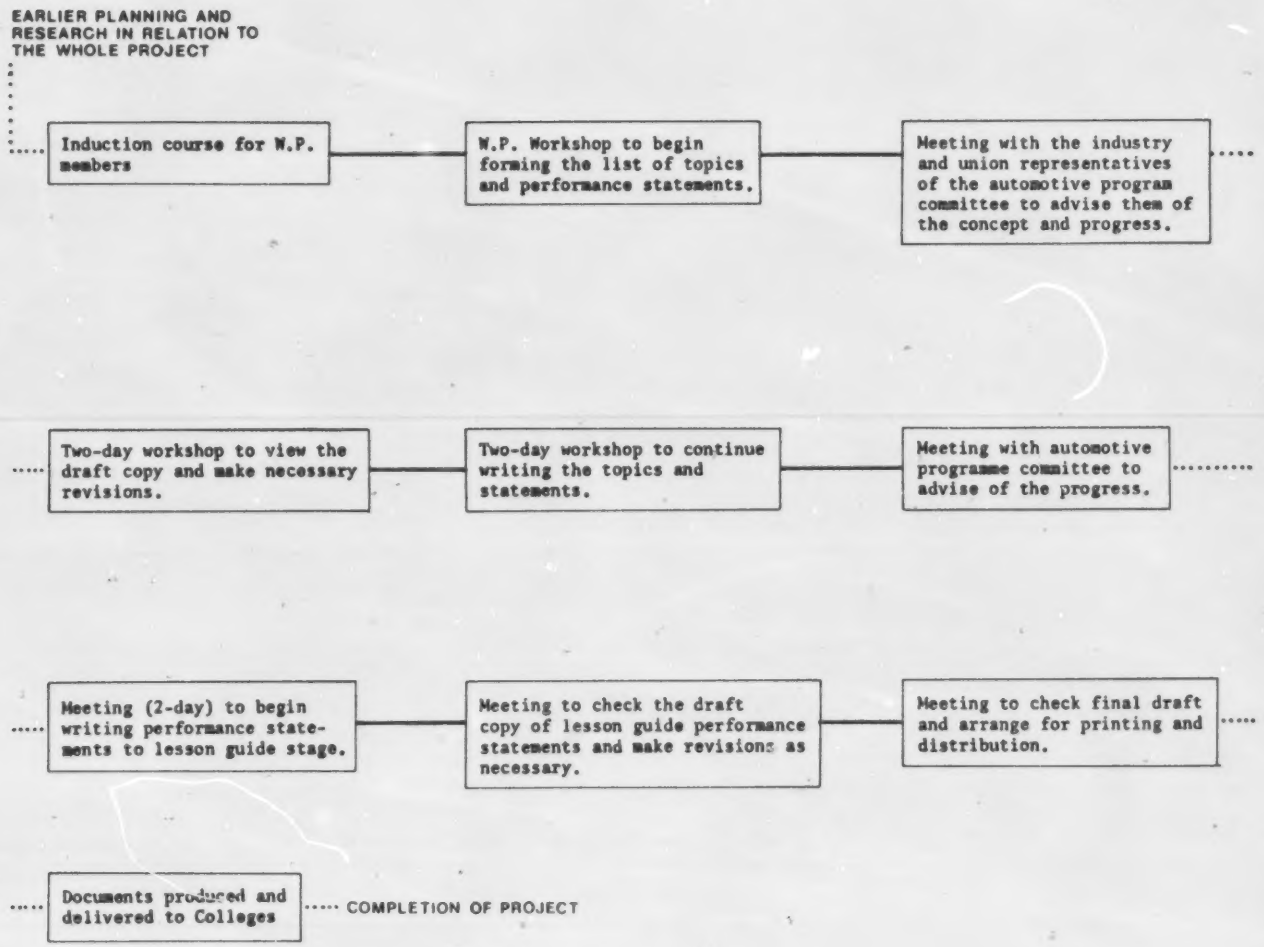
COURSE AIM

To assist automotive mechanic students to become skilled in automotive technology so that they are able to carry out maintenance and diagnose and rectify faults using established industrial procedures and safety practices and to develop research and communication skills.

appendix F

APPENDIX F

INDUCTION COURSE AND WORKSHOP FLOWCHART


EARLIER PLANNING AND RESEARCH IN RELATION TO THE WHOLE PROJECT
Induction course for W.P. members
W.P. Workshop to begin forming the list of topics and performance statements.
Meeting with the industry and union representatives of the automotive program committee to advise them of the concept and progress.
Two-day workshop to view the draft copy and make necessary revisions.
Two-day workshop to continue writing the topics and statements.
Meeting with automotive programme committee to advise of the progress.
Meeting (2-day) to begin writing performance statements to lesson guide stage.
Meeting to check the draft copy of lesson guide performance statements and make revisions as necessary.
Meeting to check final draft and arrange for printing and distribution.
Documents produced and delivered to Colleges
COMPLETION OF PROJECT

APPENDIX G

INDUCTION COURSE MATERIALS

The following remarks are taken from overhead transparency slides used during the induction course.

THIS IS WHAT WE WILL DO IN THESE TWO DAYS

1. Introduce the Objectives Approach

2. State some reasons why the objectives approach is preferred

3. Discuss the major curriculum considerations as they relate to this project

4. Study in detail

    4.1 Construction of a duty/task network
    4.2 Compilation of job/task lists as required
    4.3 Preparation of learning objective matrix
    4.4 Writing up of lists of performance objectives

5. Develop the above documents

6. Identify; Evaluation criteria, referent situations, and further refine enabling objectives.

ANALYSIS OF OCCUPATIONAL INFORMATION

Brainstorm and Delphi sessions

Bibliographic Search

- In School
- Documentation
- In State
- Interstate
- International

Survey

- Courses
- Staff
- Students
- Graduates
- Industry and Commerce

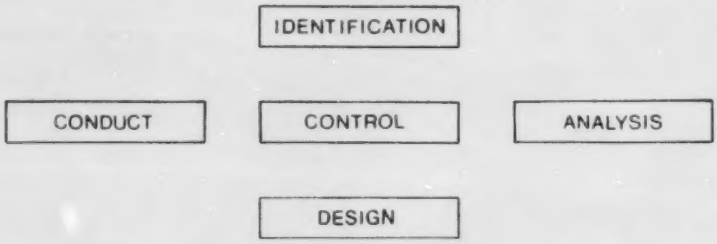
WHY THE "OBJECTIVES" APPROACH

- A requirement of the Automotive Programme Committee
- Need for uniformity of standards across schools
- Increasing accountability of Technical and Further Education institutions
- May be used to show to students so that they can plan their study accordingly
- School can justify to clients the standards of achievements
- The game, "I'm the lecturer and know a secret; guess what you have to do to pass", is eliminated
- Provide a foundation for the teaching and learning - Note equipment and media requirements
- Enable appropriate tests to be made
- Requirements of accreditation by the Tertiary Education Authority of South Australia, T.E.A.S.A.

OBJECTIONS TO THE OBJECTIVES APPROACH

- Restricts and binds the lecturing staff
- Objectives are "unrealistic"
  - (1) From the Department's point of view
  - (2) From the Industry's point of view
- Teaching to the exam

MAJOR CURRICULUM CONSIDERATIONS FOR THIS PROJECT



IDENTIFICATION OF NEED

PERCEIVED NEED

- Field staff
- Colleges and Schools
- Lecturers
- Industry and commerce
- Individuals
- Societies
- Groups
- Departmental Committees

ATTENDANCE ARRANGEMENT

INVOLVES A SEQUENCING OF CLUSTERS OF TOPICS

- Day Release
- Block Release
- Continuous
- External
- Personalised

PROGRAMMING

PRESENTATION OF THE COURSE

CONDUCT

LESSON GUIDES

Involves:

- Lesson objective statements
- Sequencing of Topics
- Teaching strategies
- Listing of aids
- Listing of references
- Assessment

DESIGN OF COURSE (Development of Automotive Mechanics Matrix)

DUTY/TASK LIST

LEARNING OBJECTIVE MATRIX

PERFORMANCE OBJECTIVE STATEMENTS

- Evaluation Criteria
- Enabling Objective Statements
- Referent situations

VALIDATION SHEET

PERFORMANCE STATEMENT	ASSESSMENT CRITERIA	ENABLING OBJECTIVES	REFERENT SITUATION
The student will be able to recognise clutch plate refinements	Written Test	Knowledge of clutch plate construction.	Clutch shudder in vehicles.

LIST OF REFERENCES

LIST OF REFERENCES WITH ANNOTATIONS

The following references are listed under two headings. The first group lists books that are particularly relevant to members of curriculum committees in that they detail applied educational research work undertaken by other institutions. Any person consulting these materials is in a position to compare and contrast the approaches used by these institutions with those developed within the Department of Further Education.

REFERENCES RELEVANT TO CURRICULUM COMMITTEE MEMBERS

Ammerman, H.L., and Pratzner, F.C., Performance Content for Job Training Vols 1, 2 & 3 Ohio State University, Columbus 1977.

These materials describe in detail the rationale, methodology and procedures for undertaking a task analysis for a given occupation and then converting these statements into performances. The materials are directed to management personnel. The approach is distinctively a performance based one and as such represents a significant departure from the systems approach philosophy.

The approach selected for the D.F.E. automotive mechanics study differs from that described by the Centre for Vocational Education authors, especially in regard to resources allocation and project management. Even so, both reflect a strong performance based rationale.

The project team found that some procedures reported by the Centre for Vocational Education authors were quite inappropriate for this particular South Australian project. Team members consider that each project should be developed as a unique series of activities which are nevertheless consistent with a general philosophy and framework.

Royal Australian Navy. Training Systems Manual, R.A.N. School of Training Technology, Vol 1 1976, Vol 2, part I 1978 & Vol 2 part II 1979.

These materials describe in detail the method used by the Royal Australian Navy to undertake one particular kind of occupation survey. This is then followed on by discussions on objective setting, development of learning materials through to the stage where a complete systems package is prepared.

The rationale for developing a total package reflects early behaviouristic thinking. It is also consistent with an institutional system that employs its own trainers as well as its trainees; this allows fuller control over both the learning and the teaching than is the case for an organisation like the Department of Further Education which does not employ its own trainees.

Nevertheless, ideas contained in these documents proved fruitful when modified to suit a performance approach. It should be noted that if a curriculum committee decides to undertake certain types of analyses, other than a task analysis, then the R.A.N. materials would not be so appropriate.

REFERENCES RELEVANT TO PERSONS UNDERTAKING FURTHER STUDY

Persons undertaking academic courses at a University or College of Advanced Education may also consult this report. The following references have been edited by the project officer with this audience in mind. Books listed

within the previous group are also mentioned, but the annotation has been modified to suit the student target group.

Bloom, B.S., Human Characteristics and School Learning. New York: McGraw Hill Book, 1976

This book is about a theory of school learning which attempts to explain individual differences in school learning as well as to determine the ways in which such differences may be altered in the interest of the student, the school, and, ultimately, the society. It attempts to test the view that most students can learn what the schools have to teach provided the problem is approached sensitively and systematically.

Bloom, B.S., (ed) Taxonomy of Educational Objectives: The classification of Educational Goals. Handbook 1 and Handbook 2, London: Longmans, 1956

The publication attempts to build a taxonomy (orderly classification of concepts) of educational objectives. Use of the taxonomy can help one gain a perspective on the emphasis given to certain behaviours by a particular set of educational plans. The books are a group product, and the direct outgrowth of over thirty persons who attended taxonomy conferences which concerned itself with producing a theoretical framework on which the goal of the educational process could be based.

Davis, R.H., Alexander, L.T., and Yelons, S.L., Learning System Design: An Approach to the Improvement of Instruction. New York: McGraw-Hill, 1974

Learning System Design is the consequence of the author's combined experience as learning system designers and training consultants for education, industry, and military organisations. Preliminary versions of the manuscript have been used for inservice and preservice training programs to help teachers develop a more systematic approach to instruction and to acquaint them with instructional principles derived from modern psychology.

Gagné, R.M., and Briggs, L.J., Principles of Instructional Design. New York: Holt Rinehart and Winston, 1974

In writing this book the authors had in mind the need they saw for knowledge of how instruction may be systematically designed, on the part of teachers, curriculum developers, instructional leaders and managers, as well as those in related educational professions. The book describes both the derivation and application of methods which can be used to design topics, courses, and lessons of instruction, in a variety of subjects, based upon principles of human learning and performance analysis.

Hermann, G.D., Richardson, E., and Woodburne, G.J., Trade and Technician Education; Principles and Issues. Sydney: Cassell Australia, Sydney, 1976.

Sections A and C from this book are most applicable. The framework of trade and technician education is presented in Section A. The section does not concentrate solely on further education in Australia but explores examples from developed and developing countries where such material was thought to have particular pertinence or has some outstanding feature. Curricula in trade and technician education is investigated in Section C.

The similarities and differences between education and training is discussed, and the historical development of education for the tradesperson and technician is presented.

Magor, R.F., and Beach, K.M. jnr., Developing Vocational Instruction. Belmont: Fearon Publishers, 1967

Within the pages of this book is found an early attempt to make available to the vocational educator the issue of modern educational technology. Each step involved in the systematic development of instruction is described. The book is designed to aid both the skilled craftsman who is preparing instruction through which to teach his craft, and the experienced vocational instructor who is interested in improving his present course or finds it necessary to prepare a new one. Quite significantly the material is presented in plain English, in that there has been an obvious effort to avoid pedantic comment to burden the reader.

McAshan, H.H., Writing Behavioural Objectives; a New Approach. New York: Harper and Row, 1970

This book deals with the techniques or mechanics of writing behavioural and other types of performance objectives using a goals approach. Techniques are developed that are designed to promote objective writing competency. The information contained in the text has been planned to present the desired specifics in a direct and precise manner.

Royal Australian Navy Training Systems Manual. RAN School of Training Technology, 1976

This manual gives an introductory outline of various procedures recommended for the implementation of a systems approach to training. The manual does not attempt to substitute for the learning that takes place between a group of trainees and an instructor; rather it offers a strategy to assist this learning to take place.

ADDITIONAL REFERENCES

Ammerman, H.L. and Melching, W.H. (1966). "The Derivation, Analysis and Classification of Instructional Objectives", *Technical Report 66 4, Task INGO*. HumRRO, George Washington University.

Block, J.H., ed. (1971). *Mastery Learning*. New York: Holt, Rinehart and Winston.

Bobitt, F. (1924). *How to Make a Curriculum*. Boston: Houghton Mifflin.

Churchman, C.W. (1968b). *The Systems Approach*. New York: Dell.

Cronback, L.J. (1971). "Test Validation", in Thorndike, R.L., ed., *Educational Measurement*. American Council on Education.

Duncan, K. (1972). "Strategies for Analysis of the Task", in Hartley, J., ed., *Strategies for Programmed Instruction: An Educational Technology*. London: Butterworths.

Eisner, E.W. (1976a). "Educational objectives: help or hindrance?" *School Review* 75, 250-60.

Macdonald-Ross, M. (1970). "Introductory Notes on Objectives, Assessment and Activities", *IET working paper No. 2,* The Open University, Bletchley, England.

Macdonald-Ross, M. (1972a). "Behavioural Objectives and the Structure of Knowledge", in Austwick, K. and Harris, N.D.C., eds., *Aspects of Educational Technology VI.* London: Pitmans.

Vargas, J.S. (1972). *Writing Worthwhile Behavioural Objectives.* New York.